

INTRODUCTION

The basic input/output system, or BIOS, is the tiny operating system that loads before your main operating system. It performs several checks on your PC's hardware to ensure everything is working correctly, and it configures your hardware before your system starts properly.

The BIOS controls some crucial settings. You access these from the BIOS setup program. Some of the BIOS's settings override those in your operating system, so it's important that they are set up correctly. The BIOS also provides plenty of information about your PC, so it can be very handy when you're troubleshooting. The main problem with the BIOS is that it's not particularly easy to use. It has a simple text-only interface and the built-in help is minimal.

Luckily, *Shopper* can help. This guide takes you through the main BIOS functions and what they do, as well as shedding light on some of the more obscure options.

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BIOS settings explained

In the first of a new series of hardware projects for enthusiasts, Chris Fynamore explains how to get to grips with the BIOS

Our guide to the BIOS covers the most important settings on the main screens you'll encounter. The details of your BIOS reflect the specific chipset and other components installed on the motherboard, which means that different systems have different BIOS features. Yours may not have all the features mentioned here but it should have most of them, though they may have different names. To access all these screens, you typically press the Delete key on your keyboard immediately after switching on your PC.

1 THE MAIN SCREEN

The Main screen contains the most basic settings of the BIOS. The screen lets you change settings such as the date and time, but also displays useful system information, such as the type and speed of your processor. If the BIOS doesn't have the name of your processor exactly right, your motherboard may not recognise it, and this can lead to the processor being set up incorrectly. If the processor name is wrong then you may need to update your BIOS (see the 'Flash forward' box below for details). To see if your BIOS is current, compare the BIOS version displayed at the top of the Main BIOS screen with the version of the latest BIOS update available on your motherboard manufacturer's website.

The Main screen also shows you how much RAM is installed in your PC, and in which slots. Again, if the BIOS is misreporting the amount of RAM in any of the slots, you may have a problem with one of your memory modules or the motherboard may not recognise the type of memory installed. Try swapping the RAM modules around to find out whether the module or the motherboard is at fault.

The Main screen may also let you specify whether or not you have a floppy drive installed. If you don't have a floppy drive but the BIOS thinks you do, your computer may pause or display an error on startup, so set this option to Disabled if you don't have a floppy.

Another useful option you may find on the Main screen is the Halt On option. This specifies under what circumstances your PC will stop its boot sequence. Typical options are All Errors, No Errors, All but

keyboard and All but diskette. Setting the PC to ignore such errors is handy if you have a PC without a keyboard attached, such as a server.

2 THE ADVANCED SCREEN

The Advanced screen lets you change several low-level settings. Some of these affect the way your PC behaves before it loads Windows, while others will override some of Windows' hardware settings. It's typically split into several subpages.

The Peripheral Configuration page lets you enable or disable hardware devices that are built into the motherboard. If you disable a device in the BIOS, then Windows won't even know it exists and it won't appear in Device Manager. You may want to disable certain devices if they conflict with other devices plugged into your motherboard, or if you don't want to install a certain device and want to stop Windows nagging you for a driver. For example, you may have a third-party sound card plugged into your motherboard so don't need onboard sound. This is also the place to look if one of your ports isn't working; some PCs ship with Serial or Parallel ports disabled, so you'll need to enable them if you want to use legacy modems and printers.

The Drive Configuration page shows you information about the optical drives and hard disks in your PC. If your PC won't boot into Windows, you can have a look at this screen to see if the BIOS has recognised your hard disk. This will let you determine whether you have a problem with your Windows installation or a physical problem with your hard disk. Depending on your motherboard, you may also need the Drive Configuration page to configure a RAID array with your SATA hard disks. Many motherboards with integrated SATA RAID controllers let you configure the SATA ports on your motherboard individually, so the disks attached to them can either be made part of a RAID array or configured as standalone IDE disks.

HARDWARE MONITORING

Motherboards are full of sensors that keep an eye on the temperature of your components, the speed of your processor cooler and system fans, and the voltages

Flash forward Updating your BIOS

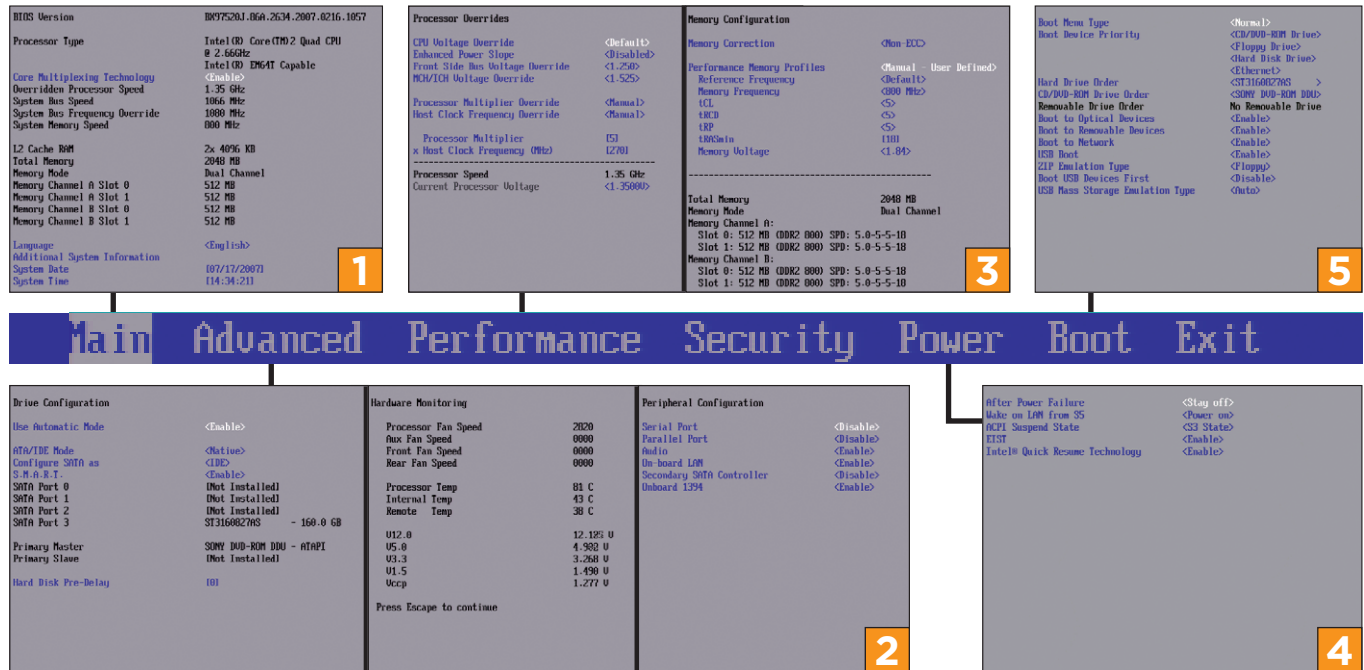
Updating or 'flashing' your BIOS can add useful features to your BIOS. It can also improve the processor support of your motherboard and fix any minor bugs in the original program. There are a few different ways to perform the update, depending on your make of motherboard and BIOS manufacturer. You normally need two files: the BIOS file itself, and a utility to flash the BIOS. The exception is when your motherboard supports flashing straight from the BIOS, which is the case with certain Asus motherboards.

Not all BIOS update programs work with all types of BIOS, so you need to make sure you use the BIOS

update program supplied by your motherboard's manufacturer. This should be available to download from the support section of the manufacturer's website.

Some motherboards can update the BIOS from within Windows, using a program such as WinFlash, but many require you to boot into DOS using a floppy disk. The best way to create a boot disk with enough room left for a BIOS file or files is to use the Driver Free Disk for BIOS Flashing from www.bootdisk.com. This executable file will turn a blank disk into a bootable DOS disk while leaving plenty of room for the BIOS files.

TYPICAL BIOS SCREENS



being delivered to your components. This information is useful if your PC is unstable, as you can check whether components are overheating or not getting sufficient voltage from the power supply. You can also see if any of your fans have stopped working. The BIOS's hardware monitoring screen, which is sometimes called PC Health, provides this information, and you can also access the sensors' information from within Windows by using a utility such as SpeedFan from www.almico.com/speedfan.php.

3 PERFORMANCE

The Performance page can fall under a number of names, such as Cell Menu, JumperFree Configuration or Motherboard Intelligent Tweaker, depending on the manufacturer of your motherboard and BIOS. Not all motherboards, especially not budget models, have this page, which lets you manually set the speed of your processor and memory. This is useful when the motherboard doesn't detect the speed of your processor properly, or messes up your memory timings. To see if your processor and memory are running at the correct speed, use the free CPU-Z utility from www.cpuid.com/cpuz.php. Look up your processor model number on the processor manufacturer's website and note how fast it should run. Then check how fast it's actually running using CPU-Z.

The two factors that determine how fast a processor runs are the host clock frequency and the processor multiplier. The host clock frequency multiplied by the processor multiplier gives the processor's speed. You shouldn't need to change the host clock frequency, but if your processor is running slowly you may have to increase the processor multiplier to make it run at the correct frequency.

It's fairly rare that a motherboard will run a processor at the wrong speed, but memory settings can be all over the place. Different types of memory are rated to run at different speeds, expressed in megahertz, but they're also rated to run at different latencies. If a memory module is being asked to run too fast or at too low latencies, your PC may become unstable. You

should check that your memory is running at its maximum rated speed and the maximum speed allowed by the motherboard.

To check how fast your memory's running, use CPU-Z again. First, click on the SPD tab, and look at the timings table at the bottom. The maximum rated speed supported by both your RAM and motherboard will be listed on the far right of the table. Note this down, along with the latency information underneath, such as the CAS# Latency and the RAS# to CAS#. Then click on the Memory tab and compare your notes to your memory's current speed and latency settings. If they don't match, you'll have to change the timings in the Memory Configuration page in the BIOS. Set the timings to manual mode and enter the timings you noted down from CPU-Z.

4 POWER OPTIONS

Depending on how you use your PC, it's worth customising the power options in the BIOS. You can set what your PC does once the power comes back on after a power cut. You can set it to remain off, resume its last state or turn on. If you use your PC as a home server or a Media Center, you'll want the PC to power back up after a power cut, so you should set it to last state or turn on. Last state is more flexible than power on; the PC powers up only if it was on before the power went out, but will remain off if you deliberately left it powered down.

Another option worth looking at is the PC's ACPI Suspend State. This determines what your PC does when you set it to Standby in Windows. There are two main standby types: S1 and S3. S1 is a primitive form of standby, which just turns off the monitor and processor, but keeps the power supply and system fans running. S3 is more advanced, and saves a lot more power by shutting down everything apart from the memory. The system state is kept in the memory, so when you resume from standby all programs and documents remain as they were. S3 is particularly useful if you have a Media Center PC, as you can put the PC in S3 standby mode where it will use only a couple of watts,

and it will resume automatically when it needs to record a TV programme.

5 BOOT MENU

If you're going to reinstall Windows on your PC, it's vital to know how the Boot menu works. When you install Windows, you boot from the Windows CD to run the installer. Some PCs aren't set to boot from the optical drive first, so you must change the boot priority. The Boot screen lets you set the boot order of the drives in your PC. If the optical drive is set to boot first, the PC looks for a bootable CD and asks if you want to boot from it. If you have a floppy drive installed, set the BIOS to look for a bootable floppy first – useful if you want to use a bootable floppy to update your motherboard's BIOS.

If you don't have a floppy disk, some motherboards also let you boot from a USB flash drive, which can emulate a floppy disk. You can also use a bootable USB flash drive to load small Linux distributions such as Damn Small Linux (www.damnsmalllinux.org). Sometimes a BIOS can be set to treat a USB drive as a floppy if it is smaller than a size you specify.

EXIT MENU

Changing BIOS settings can sometimes mess up your system, but it's easy to recover the original settings if things go wrong. If you have changed a setting you feel you shouldn't have and can't remember what it was originally, you can easily quit the BIOS without saving by pressing Escape at any time. The Exit screen also gives you the option to Exit Discarding Changes and you can also load the manufacturer's defaults. Some BIOSes also let you save your own custom defaults and load them when necessary.

If you have a BIOS disaster and can't even get into the BIOS to load your default settings, all is not lost. You can reset the BIOS manually, usually by turning your PC off, changing a jumper setting on the motherboard and powering the PC on again. The motherboard then loads the BIOS defaults. Consult your motherboard's manual for details on how to reset the BIOS in this way. ☐